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BT Fuze Products Division

NDIA 39th Annual Guns and Ammunition Conference

Low Cost Solutions for Modern Munitions

EF Cooper

Q: Do new weapons designs require new fuzing / S&A's?

A: Yes, but not necessarily cutting edge or developmental technology

- Cost
- Reliability
- Weight & dimension
- Environments

Low Cost Solutions for Modern Munitions

Contents

- **M762A1 or M577 Fuzing High Volume Product Building Block**
  - **PGMM**
  - **XM984**
  - **APKWS Block 1**
  - **Self Destruct Fuze**

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M762A1/M767A1 ET Fuze

Artillery • Electronic Time Fuze

Commander's Award Winner

Best TACOM-ARDEC Producer

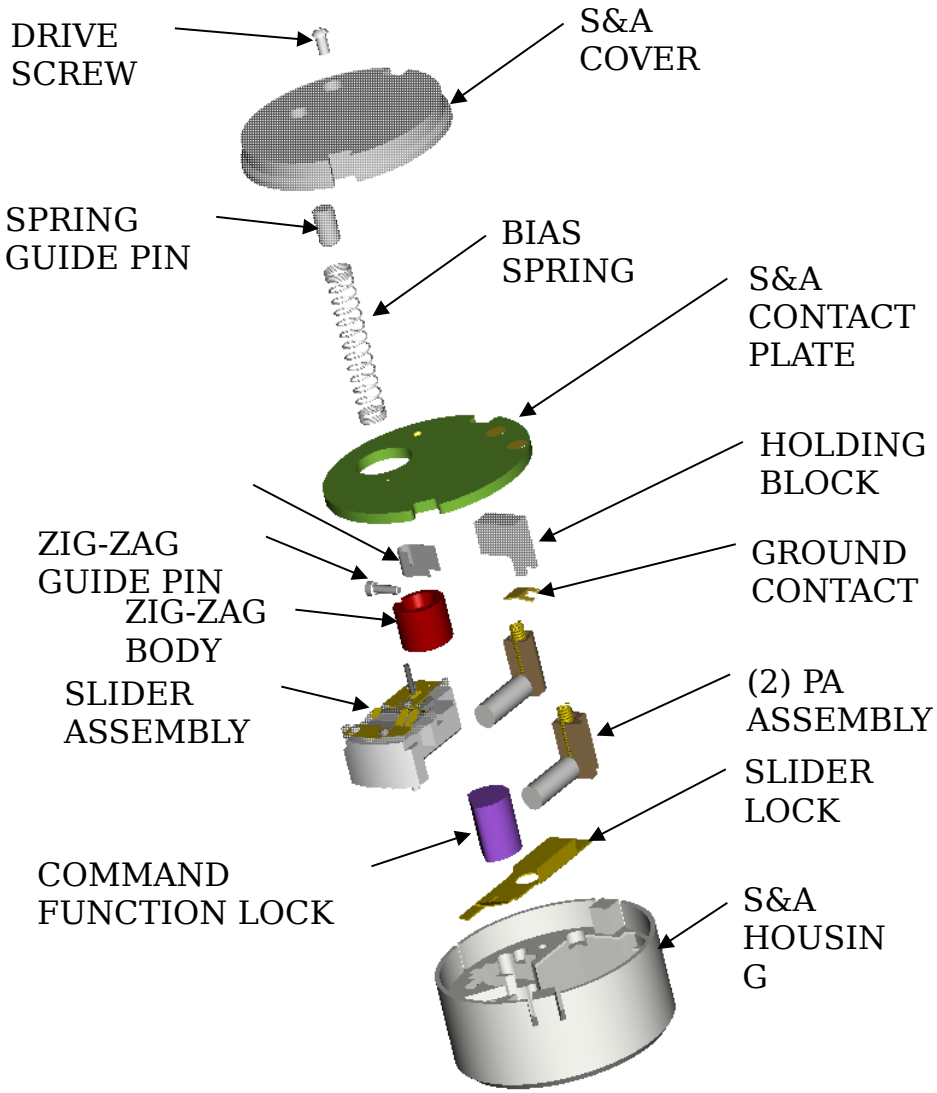
<u>Multi-Year Contract</u>
(awarded 9/2001)
600,000 base plus
100% option potential

- **Premier electronic-time artillery fuze**
- **Designed for 105mm and 155mm artillery**
- **Used with cargo-dispensing, smoke, and illuminating projectiles**
- **Converts to M767A1 when used with an explosive booster for HE projectiles**
- **99+% Acceptance; 93% Industry**

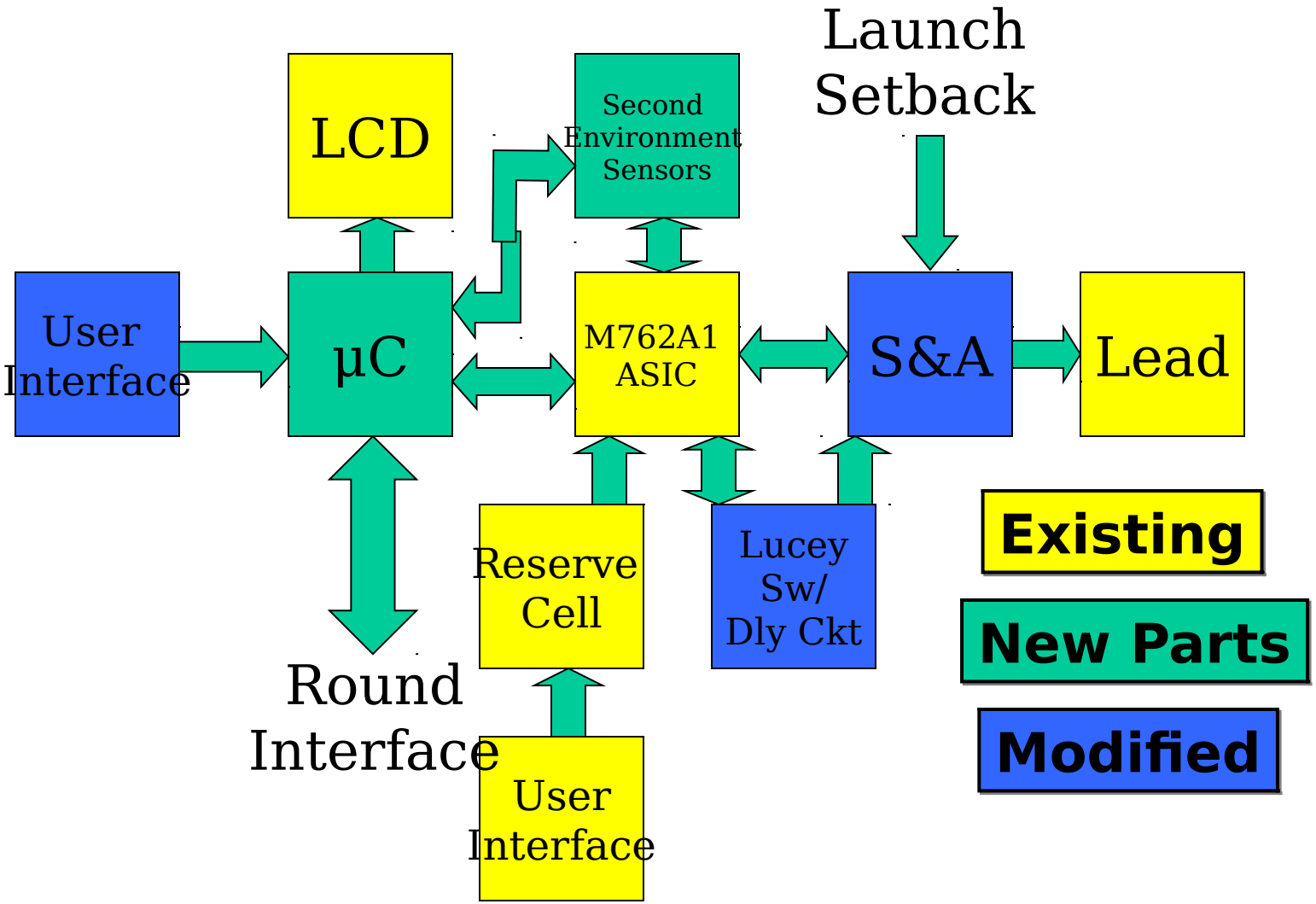
PGMM

Mechanical S&A Solution selected by ARDEC, Lockheed, ATK and Raytheon

PGMM


DRIVE SCREW
S&A COVER
SPRING GUIDE PIN
BIAS SPRING
S&A CONTACT PLATE
HOLDING BLOCK
ZIG-ZAG GUIDE PIN
GROUND CONTACT
ZIG-ZAG BODY
SLIDER ASSEMBLY
(2) PA ASSEMBLY
SLIDER LOCK
COMMAND FUNCTION LOCK
S&A HOUSIN G

PGMM


Launch
Setback
LCD
Second
Environment
Sensors
User
Interface
µC
M762A1
ASIC
S&A
Lead
Reserve
Cell
Lucey
Sw/
Dly Ckt
Round
Interface
User
Interface
Existing
New Parts
Modified

Side View of S&A Design

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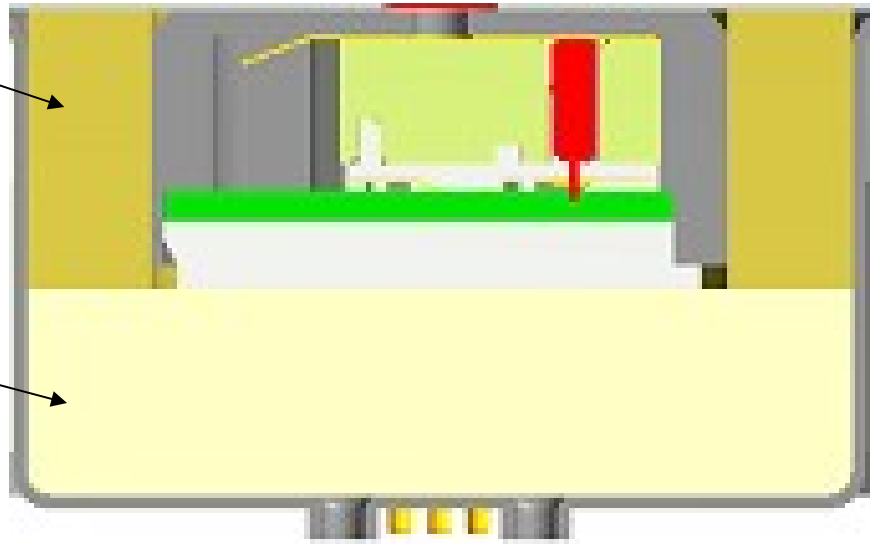
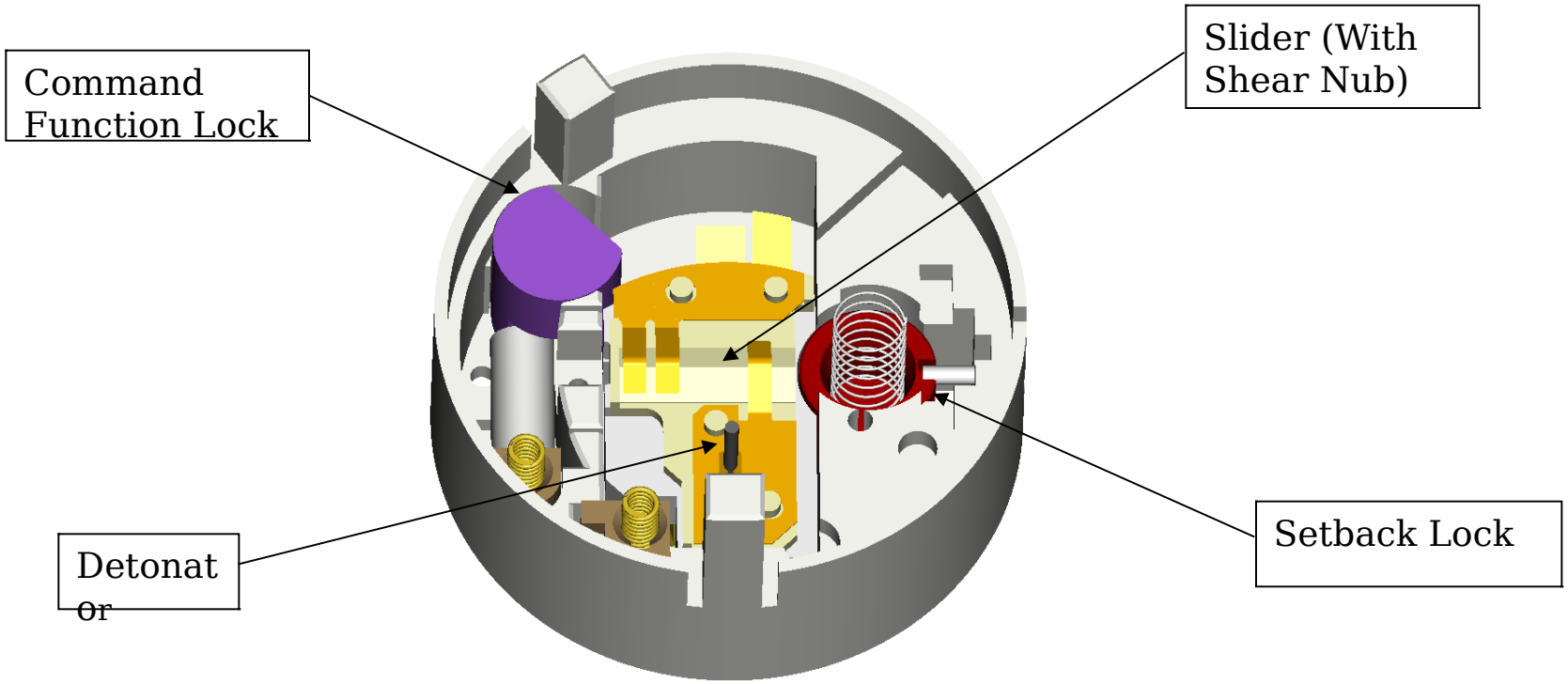
Mechanical S&A

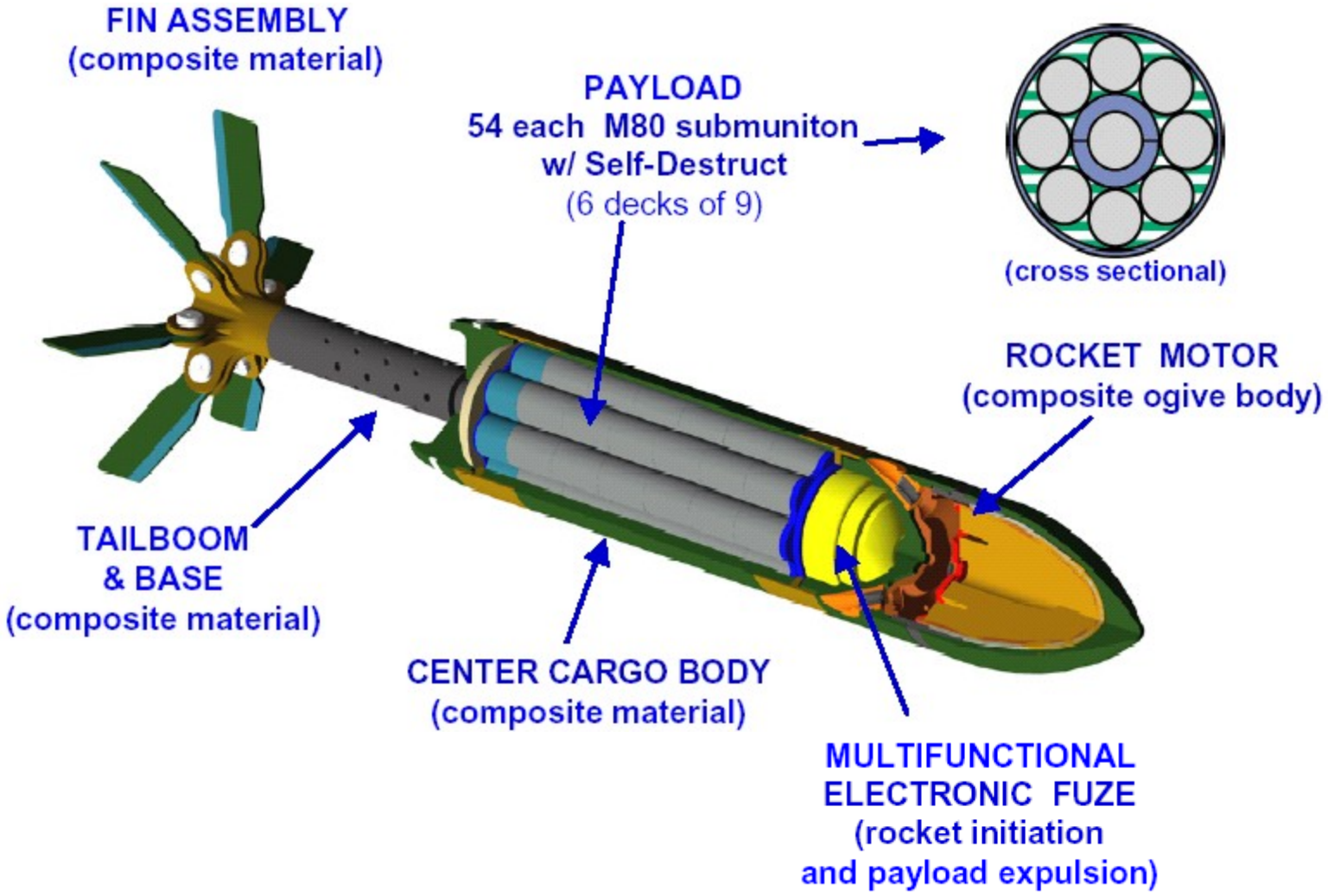
Electrical Support Circuitry



S&A Design

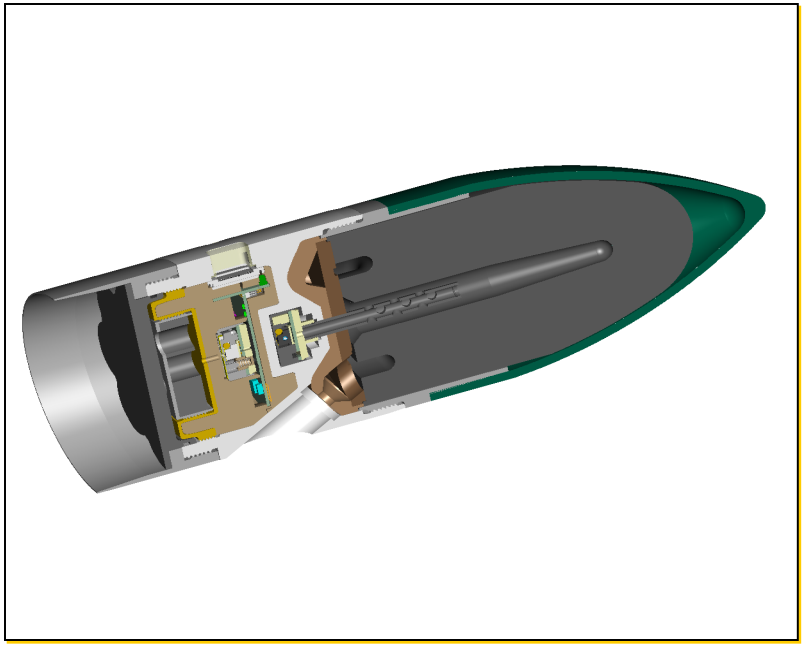

Command Function Lock
Slider (With Shear Nub)
Detonator
Setback Lock

XM984


FIN ASSEMBLY
(composite material)
PAYLOAD
54 each M80 submuniton
w/ Self-Destruct
(6 decks of 9)
(cross sectional)
ROCKET MOTOR
(composite ogive body)
TAILBOOM
& BASE
(composite material)
CENTER CARGO BODY
(composite material)
MULTIFUNCTIONAL
ELECTRONIC FUZE
(rocket initiation
and payload expulsion)

XM984 Mortar Extended Range DPICI

Mortar • Future Multifunction Electronic F



- M762 fuze technology
- Two-fuze configuration
- Separate timing requirements

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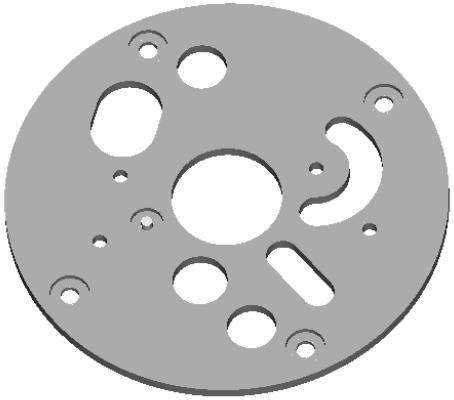
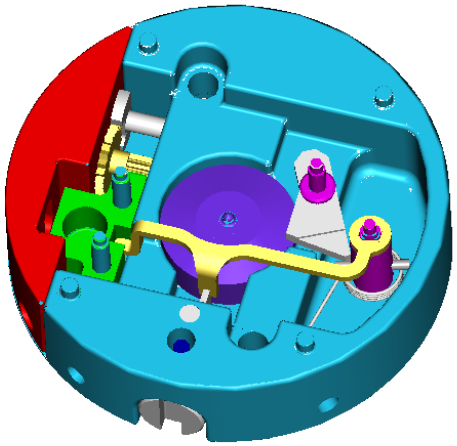
APKWS Block 1

APKWS Block -1





- 2.75” Rocket with a guidance & target detection module
- Needed a mechanical system reacting to launch to power up systems electronics
- Answer: an M577 mechanical fuze modification (40 year design)
- Withstands TV, drop, etc
- Live firing trials 100%
- Low cost materials
- Low cost production methods

Low Cost SDF for ICM Rounds

Pyrotechnic Self Destruct Fuze

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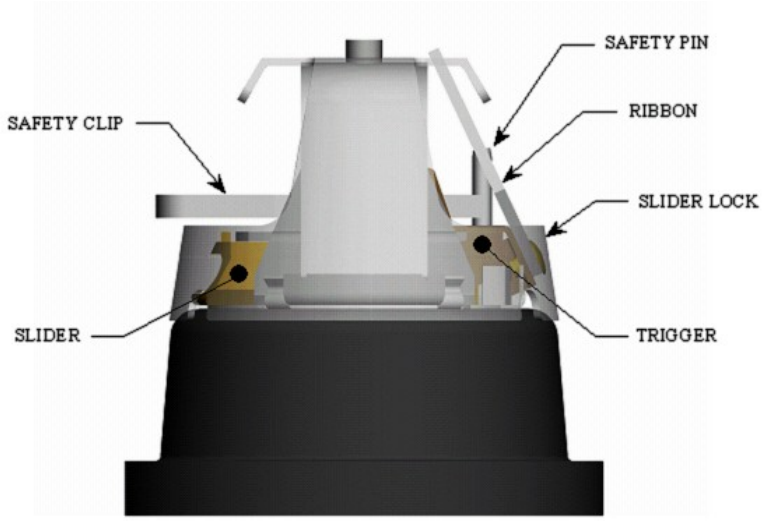
Current Contract Requirements

- 20-Year or better storage life
- SDF function time ≥ 24 sec
- Reliability:
  - Primary Mode 95%
  - SDF Mode 95%
  - Hazardous Duds ≤ 1/500

Pyrotechnic Self Destruct Fuze



Pyrotechnic Self Destruct Fuze

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M223E1 SDF Design Features

- Based on M223 Fuze Design
  - Arming screw, weight, slider, housing, cover
- Compatible with M42, M46 and M77 Grenades
  - SDF functions with or without spin
- SDF is independent of primary mode.
- All energetics are contained in slider
  - Stab ignitor, pyro delay, transfer element, M55 detonator
- Pyrotechnic delay is a standard mix (Tungsten/Barium Chromate/Potassium Perchlorate Composition: (MIL-STD-82710))
- Compatible with all existing LAP facilities

Pyrotechnic Self Destruct Fuze

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Description of Applications

Application	Projectile	Grenade	Fuze Configuration
Cannon Artillery	M915 (105mm)	M80	M223E1 (Mod)
	M483A1 (155mm)	M42, M46	M223E1
	M864 (155mm)	M42, M46	M223E1
Rocket	GMLRS	M77	M223E1 (Mod)

Pyrotechnic Self Destruct Fuze

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Value: Operational Effectiveness

- TACOM-ARDEC self-destruct timing based upon statistical analysis of grenade fall times, various ranges for both M577 and M762 fuzed projectiles
- Criteria established at minimum 24 seconds for self-destruct to preclude air bursts
- TACOM-ARDEC 24 sec criteria ensures:
  - 100% coverage for M762
  - M577 all ranges/all QEs @ a reasonable 97.7%
- L-3 BTFP design exceeds the TACOM-ARDEC standard of 24 seconds

M864 Projectile Testing, Zone 8

	December 02		December 03		March 04	
Primary Only	93	98.6%	–	–	60	100%
SD Only	96	50%	190	88%	240	100%
Tactical	95	96.8%	96	100%	132	100%

Pyrotechnic Self Destruct Fuze

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Summary

- Today: Mechanical/Pyro design exceeds contract design requirements (<1%)
- L-3 BTFP SD Fuze:
  - Developed in “three years” – IRAD/Govt. funding
  - SDF compatible with current U.S. LAP facility requirements
  - Loadable: Standard components and Technology
  - Affordable
  - Meets or exceeds 20-year shelf life
  - Reliable (100% in last test)
- Pre-Production Engineering is the IPT’s next step

Lessons Learned

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- Benefits of designs derived from production items:
  = reduced development time
  = lower production costs
  = utility with tandem & single warheads
  = no high voltage
  = batteries not needed in all applications
  = precedent cases with safety review boards
  = high 1st turn success rates
- Pure electronics are not a panacea
- Pyrotechnic and mechanical technologies provides reliable & sensible solutions